

Notice of Allowability

Application No.

09/866,090

Examiner

Ted T. Vo

Applicant(s)

BALL ET AL.

Art Unit

2122

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 11/01/04.
2. ☒ The allowed claim(s) is/are 30-39, 43-44, 48-49, 51-52, 56-63.
3. ☐ The drawings filed on _____ are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

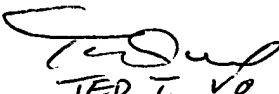
Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 11/05/04
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____


TED T. VO
Primary Examiner

1. This communication is in response to the amendment filed on 11/01/04 responsive to the Office action dated: 10/05/04.

Claims 1-29, 40-42, 45-57, 50, 53-55 are canceled.

In view of Applicants' argument, the Objection of the Oath/Declaration in prior action is withdrawn.

In view of the amendment, the rejection under 35 U.S.C 101 is withdrawn.

All remarks/arguments have been considered. The amendment of independent Claims 57-63 is fully rewritten, including limitations of Claims 28-29, 42, 47, 50, 54-55 (now canceled) in the allowance subject matter, respectively, and all of the limitations of the base claims and intervening claims.

The amendment of independent Claims 57-63 overcomes the closest arts of record, Larus et al., "Optimal Profiling and Tracing Program", ACM 1994, and Ball et al., "On The Limit of Control Flow Analysis for Regression Test Selection", ACM 1998.

Information Disclosure Statement

2. The content listed in Form PTO 1449 submitted on 11/05/2004 would not be considered because its publication date is not identified. See MPEP § 1.98 (b)(5).

Reasons for Allowance

3. Claims 30-39, 43-44, 48-49, 51-52, 56-63 are allowed.

- Prior art of record, Ball, "On The Limit of Control Flow Analysis for Regression Test Selection", discloses checking a model of a program including receiving a graph having a set of vertices and a successor function as given in Figure 1 (page 3); initializing sets of path edges, sets of summary edges,

and a work list; removing a vertex having a type from the work list; and analyzing the vertex based on the type so as to determine the reachability status of the vertex in the set of vertices, wherein analyzing includes updating a set of path edges associated with the vertex by using a transfer function associated with the vertex as given in Figure 5 (page 7). However, Ball does not disclose, featured as model checking of the program initialization included with setting each set of the sets of path edges to the empty set, and so, receiving a vertex argument and a path edge argument, forming a union as indicated in allowable subject matter in the prior action.

As pointed out by Applicants (Remarks: page 9, last paragraph), Claims 57-58 are rewritten, included with the limitations of Claims in the allowable subject matter (Claims 28-29, now canceled), the base claim (Claim 26, now canceled), and intervening claims in order to overcome the Ball's teaching above.

- Prior art of record, Larus, "Optimal Profiling and Tracing Program", discloses generating a trace for a model of a program as given Figure 1 (page 5) and page 15 (page 22) by forming a control-flow graph having vertices from the model applying a transfer function to each vertex to form a set of path edges, analyzing the set of path edges of a vertex; and tagging a unit length that the trace takes to reach the vertex from another vertex". However, Larus does not disclose, featured as generating the trace for the model of the program included with finding a shortest trace wherein finding includes finding a predecessor vertex that has the length minus a unit length as indicated in allowable subject matter in the prior action.

As pointed out by Applicants (Remarks: the last line in page 9), Claim 59 is rewritten, included with the limitations of Claim in the allowable subject matter (Claim 42, now canceled), the base claim (Claim 40, now canceled), and intervening claims in order to overcome the Larus' teaching above.

- Prior art of record, Ball further discloses generating a trace for a model of a program by forming a set of rings associated with each vertex of the model; finding a ring such that a set of path edges of a reachable vertex exists (page 8, set of p1, p2, p3, p4 in right column) and analyzing the reachable vertex based on a type of the reachable vertex so as to generate a trace from the entry of the main procedure of

the program to the reachable vertex (Figures, 3-5, "Reject", "Accept"). However, Ball does not disclose, featured as analyzing one of the two cases if a statement of the reachable vertex is a skip or not a skip statement immediately following a procedure call, finding the predecessor vertex and lifting a valuation, and so, finding a predecessor vertex according to two conditions, wherein one of the two conditions includes that the predecessor vertex be an element of a set of call vertices, as indicated in allowable subject matter in the prior action.

As pointed out by Applicants (Remarks: the last line in page 9 and page 10, lines 1-7), Claims 60-63 are rewritten, included with the limitations of Claims in the allowable subject matter (Claims 47, 50, 54, 55, now canceled), the base claim (Claim 45, now canceled), and intervening claims in order to overcome the Ball's teaching above.

Therefore, the following is an examiner's statement of reasons for allowance: The cited prior arts taken alone or in combination fail to teach claimed invention, computer-implemented methods, for checking and generating a trace for a model of a program comprising at least features,

"initializing includes setting each set of the sets of path edges to the empty set, wherein each set of the sets of path edges is associated with a vertex in the set of vertices, wherein initializing includes setting each set of the sets of summary edges to the empty set, wherein each set of the summary edges is associated with a vertex in a set of call vertices, wherein the set of call vertices is a subset of the set of vertices that represents call statements in the program", as recited in such manner in Claim 57;

"receiving a vertex argument and a path edge argument, forming a union of the set of path edges associated with the vertex argument and the path edge argument if the path edge argument is not a subset of the set of path edges associated with the vertex argument, and inserting the vertex argument into the work list", as recited in such manner in Claim 58;

"finding a shortest trace having a length, wherein the shortest trace is a subset of the at least one trace, wherein finding includes finding a predecessor vertex that has the length minus a unit length and iterating the act of finding the predecessor to find another predecessor vertex that has the length minus

an additional unit length until no predecessor vertex can be found." as recited in such manner in Claim 59;

"analyzing one of the two cases if a statement of the reachable vertex is not a skip statement immediately following a procedure call, wherein analyzing includes finding a predecessor vertex of the reachable vertex such that two conditions exist", as recited in such manner in Claim 60;

"analyzing the other of the two cases if a statement of the reachable vertex is a skip statement immediately following a procedure call, wherein analyzing includes finding a predecessor vertex of the reachable vertex such that two conditions exist ", as recited in such manner in Claim 61;

"finding the predecessor vertex and lifting a valuation associated with the reachable vertex to a path edge in the set of path edges associated with the predecessor vertex", as recited in such manner in Claim 62;

and so as,

"finding a predecessor vertex according to two conditions, wherein one of the two conditions includes that the predecessor vertex be an element of a set of call vertices, and wherein the other of the two conditions includes an existence of a path edge to the predecessor vertex in the set of path edges associated with the predecessor vertex at a ring one unit less than the ring of the reachable vertex", as recited in such manner in Claim 63.

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ted T. Vo whose telephone number is (571) 272-3706. The examiner can normally be reached on 8:00AM to 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tuan Q. Dam can be reached on (571) 272-3694. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Ted T. Vo
Primary Examiner
Art Unit 2122
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